

0.002-inch minimum and 0.006-inch maximum.

(b) [Reserved]

**§ 56.75-15 Heating (reproduces 128.2.3).**

(a) The joint shall be brought to brazing temperature in as short a time as possible to minimize oxidation.

(b) [Reserved]

**§ 56.75-20 Brazing qualification.**

(a) The qualification of the performance of brazers and brazing operators, shall be in accordance with the requirements of part C, section IX of the ASME Code and part 57 of this subchapter.

(b) Manufacturers shall perform those tests required by paragraph (a) of this section prior to performing production brazing.

**§ 56.75-25 Detail requirements.**

(a) Pipe may be fabricated by brazing when the temperature to which such connections may be subjected does not exceed 425 °F. (For exception refer to § 56.30-30(b)(1).)

(b) (*Reproduces 128.2.1.*) The surfaces to be brazed shall be clean and free from grease, oxides, paint, scale, and dirt of any kind. Any suitable chemical or mechanical cleaning method may be used to provide a clean wettable surface for brazing.

(c) After the parts to be joined have been thoroughly cleaned the edges to be brazed shall be given an even coating of flux prior to heating the joint as a protection against oxidation.

**§ 56.75-30 Pipe joining details.**

(a) *Silver brazing.* (1) Circumferential pipe joints may be either of the socket or butt type. When butt joints are employed the edges to be joined shall be cut or machined square and the edges shall be held closely together to insure a satisfactory joint.

(b) *Copper-alloy brazing.* (1) Copper-alloy brazing may be employed to join pipe, valves, and fittings. Circumferential joints may be either of the butt or socket type. Where butt joints are employed, the included angle shall be not less than 90° where the wall thickness is three-sixteenths of an inch or greater. The annular clearance of socket

joints shall be held to small clearances which experience indicates is satisfactory for the brazing alloy to be employed, method of heating, and material to be joined. The annular clearance shall be shown on drawings submitted for approval of socket joints.

(2) Copper pipe fabricated with longitudinal joints for pressures not exceeding that permitted by the regulations in this subchapter may have butt, lapped, or scarfed joints. If of the latter type, the kerf of the material shall be not less than 60°.

(c) *Brazing, general.* (1) Heat shall be applied evenly and uniformly to all parts of the joint in order to prevent local overheating.

(2) The members to be joined shall be held firmly in place until the brazing alloy has set so as to prevent any strain on the joint until the brazing alloy has thoroughly solidified. The brazing shall be done by placing the flux and brazing material on one side of the joint and applying heat until the brazing material flows entirely through the lap and shows uniformly along the seam on the other side of the joint. Sufficient flux shall be used to cause the brazing material to appear promptly after reaching the brazing temperature.

**Subpart 56.80—Bending and Forming**

**§ 56.80-5 Bending.**

Pipe may be bent by any hot or cold method and to any radius which will result in a bend surface free of cracks, as determined by a method of inspection specified in the design, and substantially free of buckles. Such bends shall meet the design requirements of 102.4.5 and 104.2.1 of ANSI-B31.1. This shall not prohibit the use of bends designed as creased or corrugated. If doubt exists as to the wall thickness being adequate, Class I piping having diameters exceeding 4 inches shall be nondestructively examined by the use of ultrasonics or other acceptable method. Alternatively, the pipe may be drilled, gaged, and fitted with a screwed plug extending outside the pipe covering. The nondestructive method shall be employed where the design temperature exceeds 750 °F.

## § 56.80-10

Prior to the use of nondestructive method of examination by the above procedure, it shall be demonstrated by the user, in the presence of a marine inspector on specimens similar to those to be examined, that consistent results, having an accuracy of plus or minus 3 percent, can be obtained.

[CGFR 68-82, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 69-127, 35 FR 9979, June 17, 1970]

## § 56.80-10 Forming (reproduces 129.2).

(a) Piping components may be formed (swaging, lapping, or upsetting of pipe ends, extrusion of necks, etc.) by any suitable hot or cold working method, providing such processes result in formed surfaces which are uniform and free of cracks or other defects, as determined by methods of inspection specified in the design.

## § 56.80-15 Heat treatment of bends and formed components.

(a) (*Reproduces 129.3.1.*) Carbon steel piping which has been heated to at least 1,650 °F. for bending or other forming operations shall require no subsequent heat treatment.

(b) Ferritic alloy steel piping which has been heated for bending or other forming operations shall receive a stress relieving treatment, a full anneal, or a normalize and temper treatment, as specified by the design specification before welding.

(c) (*Reproduces 129.3.3.*) Cold bending and forming of carbon steel having a wall thickness of three-fourths of an inch and heavier, and all ferritic alloy pipe in nominal pipe sizes of 4 inches and larger, or ½-inch wall thickness or heavier, shall require a stress relieving treatment.

(d) (*Reproduces 129.3.4.*) Cold bending of carbon and ferritic alloy steel pipe in sizes and wall thicknesses less than specified in 129.3.3 of ANSI-B31.1 may be used without a postheat treatment.

(e) (*Reproduces 129.3.5.*) For other materials the heat treatment of bends and formed components shall be such as to

## 46 CFR Ch. I (10-1-08 Edition)

insure pipe properties that are consistent with the original pipe specification.

(f) All scale shall be removed from heat treated pipe prior to installation.

(g) (*Reproduces 129.3.6.*) Austenitic stainless steel pipe that has been heated for bending or other forming may be used in the "as-bent" condition unless the design specification requires post bending heat treatment.

[CGFR 68-62, 33 FR 18843, Dec. 18, 1968, as amended by CGFR 69-127, 35 FR 9979, June 17, 1970; CGD 73-254, 40 FR 40166, Sept. 2, 1975]

## Subpart 56.85—Heat Treatment of Welds

### § 56.85-5 Heating and cooling method (reproduces 131.1).

(a) Heat treatment may be accomplished by a suitable heating method which will provide the desired heating and cooling rates, the required metal temperature, metal temperature uniformity, and temperature control.

### § 56.85-10 Preheating.

(a) The minimum preheat temperatures listed in Table 56.85-10 for P-number materials groupings are mandatory minimum pre-heat temperatures. Preheat is required for Class I, I-L, I-N, II-N and II-L piping when the ambient temperature is below 50 °F.

(b) (*Modifies 131.2.2.*) When welding dissimilar materials the minimum preheat temperature may not be lower than the highest temperature listed in Table 56.85-10 for any of the materials to be welded or the temperature established in the qualified welding procedure.

(c) (*Reproduces 131.2.3.*) The preheat temperature shall be checked by use of temperature-indicating crayons, thermocouples, pyrometers, or other suitable methods to assure that the required preheat temperature is obtained prior to and uniformly maintained during the welding operation.